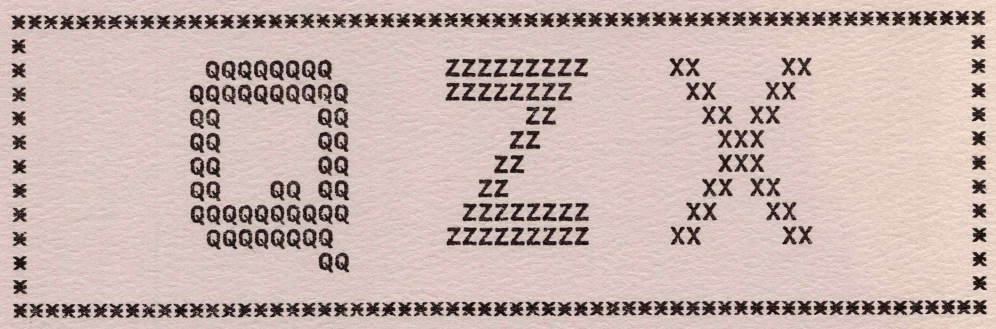

The Journal Covering Amateur Radio & Sinclair Computers
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K5XY
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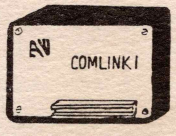

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Moving to Greener Pastures
Bo Barry, W4GHV

Quoting from someone, "I can no longer soar like an eagle, now that I'm being led by a flock of turkeys!" That saying best explains my decision to seek employment elsewhere. Several job possibilities should develop in the next few weeks, with Charlotte, NC and Winston-Salem, NC being the most likely. I knew there was a reason for holding my old W4 call forever, having received it in 1954 in Morganton, NC.

I will miss my home of 15 years, the wonderful friends I have met, the eager students I have helped, the enjoyable teaching environment I had under the previous management, and the world's most nearly perfect weather.

Alex & I will come up with some ingenious way to 'merge' our QZX efforts and other than a slight delay in next month's issue, QZX will continue as before. We will use Packet on HF (14.103) or via Fido bulletin boards before we will exchange correspondence via the mail!

COMLINK I
K5XY

This article is a review of Comlink I, an almost indispensable piece of equipment for getting a Sinclair ZX81 on packet radio. Oh, you can build your own RS 232 interface and write the required program as shown in previous issues of QZX; but, unless money is really short, this is a better way to go.

Comlink I is a small box which plugs into the ZX81, T/S 1000, and T/S 1500 and permits a TNC to plug into it to complete a packet station. A short description of Comlink I appeared on page 8 of the April issue of QZX.

It does two things, both essential for packet operation. First, it provides a standard RS 232 port for Sinclair computers. Second, it provides a firmware interface between the characters used by the computer and the ASCII characters required by a TNC and the rest of the world.

Physically the link is built into a standard box about the size and shape of a 16 K RAM addition. It even fits onto the back with a PC board connector just like the RAM box. On the other side is a standard D-shaped 25 pin RS 232 male connector. Inside is a high quality printed circuit board stuffed with a few IC's and discrete components. The components are well mounted except for a couple of resistors tacked to the RS 232 connector. In all there are eight IC's including an EPROM in a socket, eight capacitors, three diodes, one transistor, and 9 resistors.

If all one needed were the appropriate RS 232 signals, life would be easy. But Sinclair had to make certain compromises to come up with the super efficient BASIC his cost effective machine used. He did not use the standard ASCII coding for his characters. Thus to connect to the non-Sinclair world you need a translator from the patterns of 1's and 0's used by Sinclair to the patterns used by the ASCII world. The Comlink I provides this translation too. Not only that, but Comlink I provides control characters and extra punctuation which Sinclair did not use. All this is done automatically without much effort on the part of the user. The equipment even provides for canned messages and for a printed record if you wish and have a T/S 2040 printer.

Basically you get an RS 232 port, and ASCII translator, and an elementary terminal program, all for less than $55, a very reasonable price.

Use is simplicity itself. Plug the Comlink I into your ZX81, plug your TNC into the Comlink I, transfer control to the Comlink and you are ready to go.

I just connected the Comlink I to my TNC with a 25 wire straight through length of ribbon cable. But you really need only six wires in you cable as shown in the following table.

PIN	SIGNAL
1	Ground
2	TX Data
3	RX data
4	RTS Request to send
7	Ground
20	DTR Data terminal ready

The Comlink I formats its serial bytes in eight different ways. Most

TNC's can accept any one of these formats. The following table lists all the formats available.

Format Number	Number of Data Bits	Number of Stop Bits	Parity
1	7	2	Even
2	7	2	Odd
3	7	1	Even
4	7	1	Odd
5	8	2	None
6	8	1	None*
7	8	1	Even
8	8	1	Odd

* Default Format
All at 300 Baud

After connecting your apparatus, turn the computer on. The usual inverse K should appear on the TV screen. Enter the following BASIC program.

10 RAND USR 8200

Then type the keyword RUN. This program transfers control to memory location 8200 which is not in your computer. It is in Comlink I however. Note that you may be in trouble if you have added a Hunter board or some EPROM programs to your unit which do use that address. If you have an unmodified Sinclair, you will have no trouble.

At this time you will see a logo scroll across you screen and the Comlink prompt, >, will appear on your screen. You now set the character format by typing the desired format number and an ENTER. Comlink I is now operating the Sinclair machine as a telecommunications terminal. Any characters typed on the Sinclair keyboard are sent to the TNC as well as to the TV screen. Any characters sent by the TNC appear on the TV screen too. That's it.

Besides translating ASCII characters, Comlink I extends the normal Sinclair character set. Incoming TAB characters are converted to single spaces. Any incoming lower case characters are converted and displayed as UPPER CASE characters.

Control characters are created by using a CTRL (^) key which is a shifted 7. Pressing that key causes Comlink I to send the next key as a control character. For example, to send a ^C to the TNC, (to go from converse mode to command mode) press shifted 7 followed by C.

The new punctuation is given in the following table.

PUNCTUATION	KEY
!	shift 3
\	shift 2
&	shift 4
%	shift E
[	shift F
]	shift G
¬	shift H
'	shift R
_	shift W
@	shift Y
#	shift SPACE

Of course these new punctuations do not appear on the TV screen in the same form as they appear on the screens of other computers. They are mostly inverse or graphic characters on the Sinclair screen.

Comlink I will automatically repeat most characters typed on the keyboard. This feature is activated whenever a key is held down for more than 1/2 second. The key that was pressed will be repeated at a rate of 8 per second until it is released. Any character may be repeated in this fashion except Control characters.

Comlink I allows you to redefine keys 1 - 9 as Macro's. This feature may be used to transmit pre-stored messages or command strings that are used frequently. The Macro's must be first stored in REM statements before you activate Comlink I. Each key from 1 - 9 has associated with it a block of BASIC statement numbers. These are assigned in multiples of 100. For example Key 1 uses REM statements numbered from 100 to 199, Key 2 uses 200 to 299, and so on. Once the desired strings have been programmed into REM statements, they may be sent using the sequence

shift 8 n where n is any of the number keys 1 - 9.

The big difficulty with Macro's is that they use up memory and the ZX81 does not have much. I found that if I had more than three Macro's I got an error message, 4/10, out of memory.

However, the three I could use allowed me to put in the commands to connect to myself through the local digipeater for testing purposes, the commands to connect to the local bulletin board station, and a short description of my equipment. Of course, the T/S 1000 and T/S 1500 have more built in memory than the ZX81.

There are a few minor difficulties most of which are associated with the ZX81, not the Comlink I. It is slow typing on the ZX81 keyboard. An add on keyboard is really useful. The Comlink attaches in the same way as the extra RAM and is affected in the same way with wobble. This difficulty can be cured in the same way too. I have used it for days without my usual flexible cable and I got a blank screen only twice so wobble is not a big problem.

The instructions did say that a delete key had been created, but the indicated key did not work for me. However, a shift 7 followed by an H will act as a delete key. As soon as I changed the delete parameter in my TNC from off to on, the delete key worked too.

One of the most used key combinations is a CTRL C which the TNC requires to go from the converse mode to the command mode. The instructions correctly say that this combination can be obtained by a shift 7 followed by a C. I discovered an undocumented shortcut when I found that a shift 9 will work just as well and is one keystroke shorter.

When using multiple connects, you need to be able to switch from one stream to another with a switching character. The switching character usually used is |, a vertical straight line, which has not been provided by either Sinclair or Comlink I. However it is easy to change the switching character required from the default value of 7C hex to something else. I recommend @ (40 hex) which is obtained from a shift Y.

The Comlink I will also act as a general purpose RS 232 port and can be connected to any standard modem for use on the telephone lines. The Macro keys could then be reprogrammed to contain logon and logoff sequences.

In short, if you want to put your Sinclair on packet with a minimum of fuss, this is the way to go.

THE ZX81 ON PACKET
K5XY

We finally did it! The ZX81 is on packet and working very nicely too.

A packet radio station is made up of many parts and the ZX81 is but one of those parts. Most packet stations consist of a regular transceiver and supporting equipment, a Terminal Node Connector (TNC), and a computer. The computer is usually the most expensive part; but, of course, that is not true when a Sinclair is used. Still, the investment in a packet station is considerable, but most people have most of it already.

I used a 5/8 wavelength antenna, an Azden PCS-3000 two meter transceiver, a Pac-comm TNC, and a ZX81. The Sinclair computer required the use of a cheap TV set and an RS232 interface.

Those readers who want to know more details of what is required for packet communication should look at some of the articles for beginners which have appeared in the literature. A good place to start is some of the recent issues of QZX where Bo has given some of the details. The 1986 issue of the ARRL handbook has a rather historical section on packet radio. Ham Radio has an article in the July 1983 issue, 73 in the September 1983 issue, and CQ in the November 1985 issue.

This packet station was set up on two meters for several reasons. Tuning problems are eliminated (all operation is channelized). Signals can be strong (a 30 db or greater signal to noise ratio is ideal). Activity is concentrated (on 145.01 MHz). Besides, a two meter transceiver and antenna were readily available.

But before a packet station was set up, a TNC had to be acquired. The least expensive way open at the time was to get a Pac-comm kit. In due time it was constructed.

The construction was not a hard job, although it did take a bit of time. The kit instruction book was of Heathkit quality. All the parts went together with no trouble. The calibration procedure

was reasonably clear and with the built in hardware and software required no exotic instruments. Soon I had one less roll of solder, a cup full of clipped leads, and a working TNC. If you do get a kit, buy the complete kit, not just the hard to get parts because the definition of hard to get varies with your distance from a good parts distributor.

At this time, the best way to go seems to be to get an assembled MFJ TNC for about $130. It draws more current than the CMOS version of the TNC which was used in this operation. But, because all operation was from a fixed station or from a car, current drain is not an important consideration.

The first tests of the TNC were made with a Tandy Model 100 because it is small, contains a built in terminal program which is very flexible, and was readily available. I was very disappointed when the first tests proved to be a complete failure.

A trouble shooting mode was entered. Signals were traced through the circuitry of the TNC. They all seemed to be getting to the RS232 plug in the right shape. An RS232 test box was borrowed and placed in the line between the TNC and the computer. The LED's off the test box started blinking just when they were supposed to. Unfortunately they were blinking in the wrong pattern. With this clue, it was soon discovered that one of the push on plugs for the ribbon cable had been put on backwards. With this mistake corrected, everything worked as it should.

The TNC is really well designed. The Tucson Amateur Packet Radio Corporation which created the design did an outstanding job. Their efforts are one of the outstanding success stories of cooperative amateur creativity ever. The design includes calibration circuits and software programs to enable builders to calibrate the modem tones without any fancy equipment. These instructions were followed and I soon had a working TNC.

Now to hook it up to the Azden two meter transceiver. The audio from the transceiver to the TNC was no problem because the Azden has an earphone jack. The audio (and PTT circuit) from the TNC to the Azden was another matter. The Azden has a special 12 pin microphone jack for which nobody makes plugs. Not even the importer of the equipment could provide a plug. So I found an old seven pin tube socket and crushed it with a pair of pliers. I salvaged enough pins to make connections for the three wires (ground, mike input, and PTT) needed. A little insulating tape judiciously inserted between nearby pins prevented shorts (most of the time). Even the audio level from the TNC to the transceiver was at the correct level. The TNC itself required surprisingly little audio from the transceiver. So I was on the air, but not with a Sinclair computer.

The difficulty was two fold. One, the Sinclair computers do not have an RS232 port. Two, they do not work on the standard ASCII characters upon which packet (and most other digital interchange of information) works. At this time A Eckhardt, who makes the Comlink I, came to our rescue by sending us one of his units. The Comlink I remedies all these deficiencies and provides an elementary terminal program as well. A complete review of this essential piece of gear appears elsewhere in this issue.

In short order my ZX81 had its RAM pack removed and the Comlink I inserted in the rear slot in its place. A 25 wire cable (only six wires are used) was run from the Comlink I to the TNC, a TV set was attached to the ZX81, and its power supply was plugged into the wall.

Nothing happened. The inverse K refused to appear in the lower left corner of the TV screen. A little checking revealed that the power supply had gone west (presumably to California to fall into the sea). Another power supply was obtained and the K dutifully showed up.

The Comlink instructions required the following program to be entered.

```
10 RAND USR 8200
```

I entered and RAN the program. Immediately the Comlink logo started to scroll across the screen and the Comlink prompt, >, showed up at the bottom. At this point you select the format of the characters to be exchanged between the computer and the TNC. The default format of these two pieces of equipment, while different, are compatible so there is

no trouble at this point. (Soon I was in contact with W4GHV and we had fulfilled our goal of getting one of the Sinclair computers on packet. He STILL doesn't have his T/S RS-232 interface or software finished!)

To test out the configuration, I tried connecting to myself through N5ICC, a nearby strong station. Shortly after I sent the required signals, the welcome words

*** Connected to K5XY via N5ICC [06/28/86 09:35:28] appeared on the screen and I knew everything was running correctly. There was still a lot to learn about using a ZX81 on packet, however.

First I had to get from the CONVERSE mode of the TNC to the COMMAND mode, so I could terminate the QSO. Usually this is done by sending a CONTROL C (^C) from the computer to the TNC. But the ZX81 does not have a control key. Here is where the Comlink interface performs its second duty (the first was to provide the RS232 port). The Comlink allows a shift 7 to act as a control key so shift 7 C got me back in the COMMAND mode. I later discovered the undocumented fact that a Shift 9 would do just as well and saves a keystroke besides. Also a shift 1 turns out to be the same as a control Z.

Next I connected to WB5CFU, the local Bulletin Board Station (BBS) which had been beaconing the fact that it had some mail for me. I flawlessly picked up a message from K5DI and went on to other things. All this was done without WB5CFU even being near his BBS equipment.

I set the date and time with DA. I placed some text in the CT buffer which sent a message to each station that connected to me. I even put a message in the BT buffer which was sent automatically every half hour announcing the coming radio club meeting. My packet station readily absorbed all this information and kept it for later use.

But it was the TNC with its 16K of RAM which absorbed the information, certainly not the ZX81 with only 1K of RAM. The Comlink I has software provisions for ten canned messages which are easily entered and sent. The messages are ingeniously placed in REM statements added to the one line BASIC program with which it was originally activated. All REM statements between 100 and 199 are associated with the first message, all between 200 and 299 with the second, and so on. To send them all you have to do is push shift 8 and the desired message number.

So I quickly entered five messages and returned to the packet mode. I was greeted with a 4/10 out of memory error statement on the screen. Removing the messages a little bit at a time gradually let me do more things before the 4/10 error message appeared. Because of the ingenious memory saving steps Sinclair built into his little computers, there is not a set character limit on the amount of canned message you can try to store. The amount you can store depends on the amount of screen you want to display and the exact procedures you want the computer to carry out. When I restricted my canned messages to three short ones, I was not able to get the 4/10 out of memory error to appear. The T/S 1000 has twice the internal memory of the ZX81, so it will take twice the canned messages.

Next I tried operating in the multiple connect mode. In this mode you can connect to up to 10 different stations at the same time. I have a hard time carrying on two different conversations simultaneously; but some of the connections could be used for file transfer, BBS operation, or other specialized modes. To operate in this mode the TNC allows you to switch from one connection (called a stream) to another.

This switching is done by sending to the TNC a stream switch character. The usual stream switch character is |, a vertical bar (7CH), character. The Sinclair computers cannot send this character. Fortunately the TNC has a command which permits you to easily change this character.

You want to change it to some punctuation mark which is not used often. The Comlink I provides a choice of such marks. I changed mine to the @ symbol which is obtained by typing shift Y (40H) and appears on your screen as an inverse A. I picked this stream switch character because it would be the

least likely to be used in some other way. (The square brackets [] are used in time stamped headers.)

Other features of packet were duely tested and worked with no trouble. Of course, they worked because most of the work is done by the TNC and the Comlink I makes the ZX81 into a terminal just like (almost) any other terminal.

With my Model 100, I would leave my packet station on, set the Model 100 to dump all activity into a file, come back the next day and review everything that had happened on 145.01 MHz while I was away. The ZX81 does not permit this operating convenience. But if I had to be away for a while, all I needed to do was send the TNC a ^S (by keying shifted 7 S) and the TNC would do the remembering. When I got back, a ¬Q (shifted 7 Q) would send a large part of what had gone on to the screen. Of course, the TNC does not have unlimited free memory either so I could not see all the activity for eight hours, but I could see enough to make the effort worth while.

The ZX81 is not the ideal terminal. The biggest limitation is the keyboard. Touch typing is impossible. But the two finger hunt and peck method is used by many anyway and the keyboard is suitable for that method. Occasionally a key would fail to register. But then some keys would send double letters so everything averaged out. The resulting spelling difficulties were ascribed to the operator by those to which I was connected.

In any case precision in QSO's is rarely necessary, CW and RTTY abbreviations are coming back into favor, and the Comlink I even provides a repeat key capability. The whole combination was very reliable. I have kept everything powered up for days at a time with no failures.

After giving the ZX81 a good workout, I substituted a T/S 1500. Again, at first, the substitution was a disaster. The TV screen was filled only with big wiggly lines. It was then that I discovered that this computer was set to channel two while the first one had been set to channel three. Once the correct channel was in use, it was easy to see that the substitution was a great improvement. The keyboard is better and the 16K of internal RAM removes most of the memory limitations mentioned above. The keyboard is still not perfect. My shift key sometimes would not work and the space key is hard to hit squarely. I kept trying to space by hitting the edge of the case with my thumbs and I had a hard time positioning my right hand far enough to the right but the Comlink I did its interfacing job flawlessly.

Next I substituted an MFJ TNC for my Pac-Comm. The MFJ has a big price advantage over every other TNC with no reduction in the Tucson TNC features. The MFJ came in a well padded box with a thick instruction manual. I just printed out the list of TNC parameters on my Sinclair printer, substituted the MFJ TNC for the Pac-Comm, reset the parameters, and I was back in business just as before. The MFJ is a good TNC.

But this article in not an MFJ review article but an article to urge you to take the easy steps to get your Sinclair computer on packet and join the fun.

ANOTHER PACKET SUCCESS
K6USW

Let me tell you about my packet use of our computers. I have been using my T/S 1500 with a Memotech RS232 module and a T/S 2040 printer on a Heath packet unit.

There are a multitude of RS232 units that can be used to connect to various packet controllers. All of the below can communicate with a RS232 port.

For T/S 1000, ZX81, or ZX80 with 8K ROM
A CAI interface with serial chip
A Memotech RS232 interface
A Byte-Back MB2 Modem using the RS232 port
A Comlink I

For T/S 2068
A T/S 2050 Modem with Zebra RS232 kit
A Byte-Back MB68 Modem using the RS232 port

For QL
A Modem adapter and software from Curry Computers.

I think that the Sinclair/Timex line of computers is the best to use due to the low cost, which enables one to dedicate a computer to this one use.

PUBLISHER'S NOTES

Another fateful June issue is upon us even if we are a bit late and it is already July. This is a month in which a lot of subscriptions expire. If you label says 86/06 or an earlier number, please renew right now. Every subscriber counts. I was quite pleased with the last bunch of renewals which came in, but we need every one we can get to make the offset printing economical. If you know of other hams with Sinclair computers, encourage them to subscribe too.

Occasionally somebody will complain that we do not have enough articles on the T/S 1000 or the T/S 2068 but pay too much attention to the other computer. There just is not enough interest to write exclusively for one or the other of these computers. A mix is the best we can do; and, what that mix is, depends on the programs and articles which you send in.

In any case we are glad to hear from you and it is a good feeling when we can see another issue going out.

INDEXER NEEDED

KA2LHO (Kraig) says that he is shifting the emphasis of his computer work and will not be able to continue to supply many ham related Sinclair programs. One of his services to the ham community was a tape index of QZX articles. If any of our readers would like to continue this service, please write to us as soon as possible.

LOGIC IN BASIC

This article is adapted from one which appeared in the Computer Astronomy Network newsletter as reprinted in the Hampton Roads T/S User Group Newsletter.

You can speed up your BASIC programs and increase available storage if you code with logical expressions in some unusual places. These logical expressions are often overlooked program statements that can accomplish the above and also clean up many GOTO statements that often tend to clutter up a program listing.

A logical statement has two conditions, true or false, which are represented by the values '1' and '0' respectively in our Sinclair computers.

An example of a logical assignment statement might be

```
500 Let A = (X >= 10) + 15
```

If the value of 'X' is equal to or greater than 10, then 'A' will have the value '1'. For 'X' less than 10, the value of 'A' will be '0'.

A logical expression in brackets may be added to and/or multiplied by other values. for example, with the statement

```
500 LET A = 100 * (X >= 10) +
```

15 'A' takes on the value 115 when the logical expression is true and 15 when it is false.

To illustrate some of the applications of this, the following code was borrowed from "Timex/Sinclair 1000 Astronomy", in which day-month calculations are made:

```
350 IF M = 2 THEN LET D = 31
360 IF M = 3 THEN LET D = 59
 :
 :
450 IF M = 12 THEN LET D =
```

334

Here, eleven statements must be individually interpreted and evaluated by the computer. The more statements, the longer the program takes to arrive at the results. If the code is repetitively looped, the time involved is further magnified. Hence, if several statements can be combined, fewer interpretations are required decreasing program execution time. To illustrate, the following single statement can replace the above code and will execute in about 30 percent of the time:

```
350 LET D = 31 * (M = 2) + 59 * (M
```

*= 3) +. . .+ 334 * (M = 12)*

At this point in the program, M has an integer value between 2 and 12. Because it can only have one of these values, only one logical statement (inside the parentheses) will be true. The appropriate value will then be assigned to 'D' because it is the only number multiplied by '1'.

Computed GOTO statements can also be replaced in a similar manner. Instead of this:

```
100 IF A < 10 THEN GOTO 400
110 IF A = 10 THEN GOTO 500
120 IF A > 10 THEN GOTO 600
```

the following could be substituted:

```
100 GOTO 400 * (A<10) + 500 * (A=10) + 600 * (A>10)
```

As was implied in the opening statement, this method of coding, as well as being more efficient in execution, also occupies less RAM allowing you to write longer, more complex programs in much less space.

QZX FRIENDS

KE6WB -- Ed called us up on the local autopatch as he drove through Las Cruces on his way to El Paso and points east. He was going to spend a good part of his summer traveling and wanted to make sure he did not miss any of the articles on packet.

WD0DCK -- Anthony sent in some comments on two books which appear elsewhere. He lost an antenna to high winds. He also missed an upgrade test due to work. He bought a Microdrive with his tax refund and says it works beautifully. The first program he saved was Type 2068 from the June 1985 issue of QZX.

KA2LHO -- Kraig has said that his interests have moved into the areas of consulting and training so he will not be developing more programs in the Sinclair Ham Helper series. He may have some programs and equipment at bargain prices left by the time you read this. If interested write immediately. (Address in Equip column.)

K6USW -- Darwin writes to say that he uses a ZX81 as a terminal, a T/S 1500 on packet (see story in this issue), a T/S 1500 on RTTY, and a T/S 1000 on CW. A T/S 2068 for running other ham software and a QL for word processing and spread sheeting round out his computers.

K8NZZ -- Bob says that he only has a couple of T/S 1000's. He was able to make good use of the code practice program and even modified it to work in 2K, to avoid the RAM pack problems. He devised an interface to drive the transmitter using a transistor and a 5 volt reed relay driven by a Radio Shack audio amplifier. The problem was in getting it adjusted to filter out the computer hum. He has modified both of his computers to use the TI keyboard and has also modified them to use a video monitor scrounged from an old closed circuit TV system. He also has a 2040 printer and a couple of RAM packs only one of which works. He has one T/S 1000 for parts.

W6ISO -- Kit is down to 3 working ZX81/TS1000 out of 7. He keeps losing the IC 1 or ULA circuit. One is dedicated to satellite orbit prediction, a second to RTTY, and the third for general usage and checking out QZX programs. The first has the stock keyboard, the second has a TI keyboard adapted per a QZX article, and the last is Suntronics.

N9BBN -- John was going to write some packet programs but he says that was before he got his Comlink I. He says "Comlink I is the way I'm going. Hardware and software for $55 - I couldn't built it or write it for that!"

RE-VITALIZE THOSE OLD CASSETTES
WB3JDP

If you are no different than I am, you may have a box full of cassettes that have been used so many times that trying to SAVE a program results in a LOAD that crashes because of incomplete erasures. Have faith and gather around all those old tapes because I have a solution that will bring them back to "new condition".

First get an old transformer that may or may not have a bad secondary. Since we won't be using the secondary anyway, clip off those leads as close as possible. Remove any covers and preserve the primary side because this is the only winding we will be using. Remove and save any lamination compression bolts, remove all the laminations from the coil windings, and separate all the laminations. They will be stuck together by shellac, so a knife blade will be helpful. So what did you end up with? A pile of E and I shaped laminations. OK, now throw away all the straight or I sections as we won't be

using them. All you have left are E laminations. Now re-assemble all those E shapes (or as many as you can) back into the coil windings BUT all facing in the same direction. Not using the secondary coil will help here. The open side of the E's is the business side of this device that has no name yet.

Position the re-vamped transformer (laminations reclamped as tight as you can get them) into a five sided non-magnetic box of wood or aluminum. Position the open side of the laminations close or flush to the open side of your box. I used electrical potting compound in mine to completely isolate the whole thing. Very thin epoxy or fiber glass will work just as well. Of course, add an A/C cord and switch. A spring loaded momentary will do well here. What you are trying for is a device with the open end of the laminations just about touching that surface.

New gather up all those old cassettes because very shortly you will have very clean and erased cassettes.

To use this device, one places the old cassette flat on a wooden table top. Now remove your wind-up wrist watch and hide it. Place your new device, touching the cassette and turn it on. About five seconds should be enough. What you did was to turn on a very powerful magnet that erased your tape. That's all there is to it. That cassette is now in the same condition as a new tape. You can get your wrist watch now, too.

Note: Do not leave this device on too long. It gets hot. I called my device a HUM-DINGER because it also hums.

BITS AND BYTES

74. To adjust a tape recorder's volume and/or verify if a program is loading properly, simply stop the tape recorder a few seconds after you have begun to load a tape. The computer will either crash or continue searching. A crash means the program was loading correctly until the tape recorder was stopped, a search pattern means there was a problem with title, or low volume.

75. If you are having instability troubles (unexplained crashes or bad screen displays) with any Sinclair computer, you might try adding a small tantalum (0.1 - 2.2 microF, 20 volts or better) capacitor directly across the input of the regulator input. This addition will cure regulator oscillations which appear in some power supplies.

76. To initialize without pulling the plug, enter RAND USR 0.

77. Do not manipulate memory in slow mode on the T/S 1000 series. This means do not enter, display, or edit basic, or block transfer in machine code. It can mess up your memory.

*78. To find program size, PEEK 16396 + 256 * PEEK 16397 - 16509.*

79. To stop a program from automatically running, enter LOAD CHR$ USR 832 "" to load the program. When the program has finished loading, the screen will go gray for three seconds. Press BREAK and you have stopped the program, otherwise it will start running.

80. To make a program run automatically when loaded, save the program with a line statement (usually at the beginning or end of a program), 9010 SAVE "name" 9020 RUN. Now start the tape recorder and enter GOTO 9010. It will run automatically the next time it is loaded.

81. One can save memory by remembering that, for example, VAL "4E4" uses 8 bytes, while 4E4 itself uses 9 bytes. Similarly, VAL "40000" uses 10 bytes while 40000 by itself uses 11 bytes.

82. To make a line of machine code invisible (certain codes will self destruct when displayed) use POKE 16514,118 and 16515,118. Remember the machine code now begins at 16516.

83. Both PRINT and LPRINT delete the leading space of a token when used at the beginning of a PRINT, AT, or TAB statement, also when followed by another token.

84. To display the bottom two lines use within a program use (line num) POKE

16418,0. Before using SCROLL or INPUT switch off with (line num) POKE 16418,2.

85. With a machine code program stored in 1 REM, use POKE 16510,0 to change the REM number to 0, and protect it from accidental deletion.

COMMENTS ON TWO BOOKS
WD0DCK

Here are some comments on two books, one on machine language and the other on interfacing.

The first is a book entitled Mastering Machine Code on Your ZX-81 by Tone Baker. This is the best book to use if you are trying to learn machine code programming. All sections are logically grouped, and explained in an easy to understand way. In all, I found the book to be very enjoyable reading.

The next book is entitled 20 Simple Electronic Projects for the ZX-81 and Spectrum. It as written by Stephen Adams and published by Interface Publications. This book describes in clear terms how to build and attach simple but useful gadgets to our computers. Some examples are a light pen, A/D converter, and an I/O port which has eight lines each input and output with information about adding 16 more I/O lines if needed.

These books are available from Curry Computer. (Check with them about pricing and availability. Address in back issues.)

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*Pseudoscope for TS2068—A serial bit stream analyzer which mimics the action of an oscilloscope. Use to graphically portray low frequency digital signals in a horizontally scrolling graph. Program lets you store and compare samples. Print them out on a 2040 printer. Adjustable sample rate, 60hz timing dots are plotted with your input sample. Pseudoscope lets you SEE morse, rtty, serial keyboard signals, etc. as the computer sees them. Very useful in program development or in optimizing interface hardware. Tape/instruction book/full disassembly: $16.95

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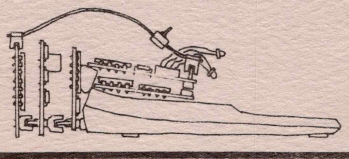

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